AN IDENTIFICATION SYSTEM

The present invention relates to a method pertaining to an identification system and also relates to an identification system.

The invention is concerned with the control of individuals and authorised personnel in respect of companies, places that require authorised access, airports, places of interest and activity, such as arenas, and other places where an identification system is required.

Known automatic identification systems typically include individual-carried ID-tags, and ID-tag reading equipment.

Known automatic identification systems that use radio frequencies, so-called RFID (Radio Frequency IDentification) include at least one transponder and at least one communicator. A known type of transponder will include an antenna, a modulator, a memory and a modulator controlling logic circuit. One such known transponder is designed to be able to receive an output signal from the communicator and reflect this signal in a modulated state. The communicator is designed to be able to receive and read the signal reflected and modulated by the transponder.

An ID-tag that includes a transponder can be placed on an individual on an object to be identified. Information contained in the transponder can be read by a communicator at a given short distance away, such as a distance of 5 metres for instance.

In order to enhance security and reliability in respect of the transfer of information from transponder to communicator there has been included a so called check sum, which is calculated by a circuit in the transponder in accordance with an appropriate algorithm on the basis of data stored in the transponder, said check sum being transferred from the transponder to the communicator in conjunction with the transfer of data.

A corresponding calculation on the basis of an algorithm takes place in the communicator subsequent to the communicator having received a signal reflected and modulated by the transponder. A comparison is made between the check sums in the communicator.

One problem with the known technique described above is that calculation of the check sum requires an electronic circuit, which, in turn, requires energy, therewith increasing the cost entailed by the transponder.

The aim of the present invention is to provide a system which includes a transponder that has a low manufacturing cost and that has an energy consumption of such low magnitude as to obviate the need for the transponder to have its own battery.

The above problem is resolved by means of the present invention.

Accordingly, the present invention relates to a method pertaining to an identification system in which a transponder reflects an inquiry signal from a communicator, wherein said reflected signal has been modulated with data that can be read by a communicator, wherein said data-carrying modulation includes a check sum calculated on the basis of data stored

in the transponder memory, and wherein the present invention is characterized by permanently storing the check sum in the transponder memory.

The present invention also relates to a transponder that includes at least one antenna, at least one memory, and at least one means for reflecting and modulating an inquiry signal from a communicator, wherein said reflected signal includes data-carrying modulation, wherein said reflected signal can be read by a communicator, wherein said data-carrying modulation includes a check sum calculated on the basis of data stored in the transponder memory, and wherein said invention is characterized in that the transponder includes a check sum stored in the transponder memory.

The invention will now be described in more detail partly with reference to an exemplifying embodiment thereof illustrated in the accompanying drawing.

Figure 1 is a preliminary drawing illustrating a transponder 1 that includes an antenna 2 and a ROM-memory 3. Also shown in fig. 1 is a communicator 4 with antennas 5,6, a memory 7, a processor 8 and a data system 9. The inquiry signal 10 and the reflected modulated response signal 11 are also shown in figure 1.

A preferred embodiment of the present invention resides in a method which is characterized by causing the check sum to be calculated on the basis of an algorithm which is identical in respect of one group of transponders and different in comparison with other groups of transponders.

A further preferred embodiment of the present invention resides in a method in which calculation in accordance with

said algorithm is caused to take place in the communicator 4 each time a transponder 1 is read, and in which the calculated check sum is compared with the stored check sum transferred by the reflected signal 11.

In one preferred embodiment of the present invention there is included a transponder 1 which is characterized in that the stored check sum is calculated on the basis of an algorithm which is identical for one group of transponders and different in comparison with other groups of transponders.

The identification system includes a communicator 4 which continuously transmits an inquiry signal 10. When a transponder 1 is in the close vicinity of a communicator 4, the signal 10 is received by the transponder antenna 2 and the signal 10 is then reflected and modulated to contain information. This information includes data permanently stored in the transponder memory 3, particularly identification data concerning an object or an individual, and a check sum that is also permanently stored in the transponder 1.

As opposed to earlier known techniques, the check sum has already been calculated and stored in the transponder 1 and does not therefore need to be calculated each time data shall be outputted. This provides the advantage of a simpler transponder 1 that lacks a check sum calculating circuit.

The check sum is calculated in the communicator 4 from data that has been received and is compared in the communicator 4 with the received check sum. If the check sums are not in agreement with one another, the information is considered to have been wrongly transferred. If the check sums are in

agreement with one another, all of the transferred information is considered to have been correctly transferred.

According to one embodiment of the invention, the check sum is calculated in the communicator 4 on the basis of the information transferred from the transponder 1 without including the transferred check sum in the calculation. According to another embodiment of the invention, the check sum is calculated in the communicator 4 on the basis of both the information transferred from the transponder 1 and on the basis of the check sum transferred from the transponder 1. Thus, in this latter embodiment, the check sum transferred from the transponder 1 is included in the calculation of the check sum in the communicator 4.

The system can be adapted for application in large companies or plants in which several different levels of authorisation exist, by using different check-sum calculating algorithms in accordance with the invention, said algorithms giving different check sums for the same data stored in the transponder 1. This procedure can also be applied when wishing to sell the system to several mutually different companies.

The following examples are not intended to limit the scope of the invention, but merely to illustrate different embodiments of the invention.

According to a first specific embodiment of the invention, the information to be stored in the transponder memory is 541 543 518 and the algorithm that calculates the check sum consists in the summation of all digits. The check sum will thus be 36. The check sum is calculated and stored in the memory of the transponder 3 together with the information 541

543 518 at the time of programming the transponder 1. When the transponder 1 is in the vicinity of the communicator 4, the transponder 1 will take receipt of the inquiry signal 10 and reflect this signal in a modified state 11. The reflected and modulated signal 11 is received and interpreted in the communicator 4. The check sum is calculated in the communicator 4 on the basis of the information that has been received from the transponder 1, excluding the check sum. The calculated check sum is compared in the communicator 4 with the received check sum. When these check sums disagree, it is considered that the information has been wrongly transferred. If the check sums agree with one another, it is considered that all of the transferred information has been correctly transferred.

According to a second embodiment, the transponders are used on ID-tags in a company-installed authority control system. The number of each individual employee is stored in the transponder 1 together with a check sum calculated on the basis of the number of individual employees. In order to enable the authority control system to be used in a company that has several different authority levels, the algorithm used for calculating the check sum is different for each level of authority. Thus, a group of employees provided with ID-tags that are intended to function together with a given algorithm will have authorised access to a specific part of the company. In the case of this embodiment, the algorithm is such that the first 100 employee numbers will have a check sum s and the next 100 employee numbers will have a check sum s+1 and the next 10 employee numbers will have a check sum s+3, where s is the sum of the digits in the employee number. When reading the information stored in the transponder 1, the communicator 4 determines whether or not the individual concerned has authorised access to a department or not, on

the basis of the check sum and with the aid of a data system 9.

A third embodiment describes authority control systems that can be sold to a large number of mutually different companies. The algorithm used for calculating the check sum consists in summating all digits in the employee number. Company A has 1000 different employee numbers divided into three (3) authority levels. The algorithm for calculating the check sum with respect to company A is such that the three different series with employee numbers give the check sums n+498 548 399, n+353 949 988 and n+818 317 802 respectively, where n is the sum of the digits in the employee number. Company B has 100 different employee numbers divided into two (2) levels of authority. The algorithm used for calculating the check sum in respect of company B is such that the check sums for the two levels of authorisation are n+113 576 915 and n+918 612 513 respectively, where n is the sum of the digits in the employee number. Company C has 6 employee numbers and only 1 level of authorisation. The algorithm used for calculating the check sum of company C is such that the check sum will be n+ 361 711 918. The possibility of choosing an algorithm for calculating the check sum of a group of employee numbers enables the system to be sold to a very large number of companies, where each company may also have several different algorithms so as to enable several levels of authorisation to be included.

According to a fourth embodiment, an identification system shall be sold to a company A. The company A has, among others, three employee numbers 145 916, 145 917 and 145 918. The algorithm for calculating the check sum of company A consists in summating the digits in the employee number and adding 319 514. The check sums obtained with the digits in

said employee numbers above are 26, 27 and 28 respectively. The check sums for company A will thus be 319 540, 319 541 and 319 542 respectively. This identification system shall also be sold to another company, designated company B. Company B also has the employee numbers 146 916, 145 917, and 145 918. The algorithm used to calculate the check sum of company B consists in summating the digits in the employee number and adding 418 724. The sums obtained with the digits in the above employee numbers are 26, 27 and 28 respectively. The check sums for company B will thus be 418 750, 418 751 and 418 752 respectively. This procedure enables the system to be sold to many companies while still retaining security.

It is obvious that the check sums and the algorithms can be varied. The person of average skill in this art is able to freely select check sums and algorithms.

The present invention shall not therefore be considered limited to the aforedescribed exemplifying embodiments, since variations can be made within the scope of the accompanying claims.